the step of forming the first layer (**3**) of the second conductivity type, the first layer (**3**) of the second conductivity type is formed so that the product between the impurity concentration of the substrate (**10**) of the first conductivity type measured beforehand and the width of the layer of the first conductivity type (N type) between the first layers (**3**) of the second conductivity type may become equal to the product between the width of the first layer (**3**) of the second conductivity type between the first layers (**2**) of the first conductivity type and the impurity concentration of the first layer (**3**) of the second conductivity type, in other words, that a charge balance may be attained.

[0134] In this manner, the concentration and trench width of the substrate (**10**) of the first conductivity type are measured beforehand, and in forming the first layer (**3**) of the second conductivity type, this first layer (**3**) of the second conductivity type can be formed while the charge balance is being adjusted. Thus, the withstand voltages of the semiconductor elements can be enhanced.

[0135] Further, in forming the first layer (**3**) of the second conductivity type, this first layer (**3**) of the second conductivity type can be formed without lowering the temperature of the substrate (**10**) of the first conductivity type stepwise. Thus, the outward diffusion of impurity ions from the substrate (**10**) of the first conductivity type into the first layer (**3**) of the second conductivity type can be prevented from occurring.

[0136] Besides, after the repeated structure has been formed, the N-channel type semiconductor element of the vertical type can be formed at the front surface layer part of the first layer (**2**) of the first conductivity type constituting the repeated structure.

[0137] To the contrary, after the substrate (**10**) of the first conductivity type has been prepared, the N-channel type semiconductor element of the vertical type is formed at the front surface layer part of the substrate (**10**) of the first conductivity type, whereupon at the later step of forming the trenches (**11**), the trenches (**11**) can be formed between the N-channel type semiconductor elements of the vertical type in the substrate (**10**) of the first conductivity type.

[0138] As the third feature, a substrate (**10**) of first conductivity type is prepared, and a trench (**11**) is formed on the front surface side of the substrate (**10**) of the first conductivity type, whereupon a first layer (**3**) of second conductivity type is epitaxially grown on the inner wall surface of the trench (**11**) to a thickness of, at most, half of the width of the trench (**11**). In addition, an oxide film (**13**) is formed on the first layer (**3**) of the second conductivity type epitaxially grown, and the trench (**11**) is filled up with the oxide film (**13**), whereby a region held between the first layers (**3**) of the second conductivity type, in the substrate (**10**) of the first conductivity type, is used as a first layer (**2**) of the first conductivity type, and a repeated structure in which the first layer (**2**) of the first conductivity type and the first layer (**3**) of the second conductivity type are alternately arranged is formed.

[0139] In this manner, the first layer (**3**) of the second conductivity type is epitaxially grown within the trench (**11**), whereby the width of the first layer (**3**) of the second conductivity type can be made small, and in turn, an ON-resistance in the first layer (**3**) of the second conductivity type can be lowered.

[0140] Besides, as the fourth feature, regarding the third feature, in forming the first layer (**3**) of the second conductivity type, the inner wall surface of the trench (**11**) provided in the substrate (**10**) of the first conductivity type is subjected to vapor phase diffusion or to ion implantation, whereby the wall surface of the trench (**11**) is formed into the first layer (**3**) of the second conductivity type.

[0141] In this manner, the first layer (**3**) of the second conductivity type is not formed within the trench (**11**), but the wall surface of the trench (**11**) can be formed as the first layer (**3**) of the second conductivity type.

[0142] In case of forming a semiconductor element, the repeated structure is formed, and the N-channel type semiconductor element of vertical type can be thereafter formed at the front surface layer part of a first layer (**2**) of first conductivity type constituting the repeated structure.

[0143] To the contrary, after a substrate (**10**) of the first conductivity type has been prepared, the N-channel type semiconductor element of the vertical type is formed at the front surface layer part of the substrate (**10**) of the first conductivity type, whereupon a trench (**11**) can be formed between the N-channel type semiconductor elements of the vertical type.

[0144] Besides, in preparing the substrate (**10**) of the first conductivity type, the impurity concentration of the substrate (**10**) of the first conductivity type is measured beforehand. In addition, after the N-channel type semiconductor element of the vertical type has been formed on the substrate (**10**) of the first conductivity type, the withstand voltage of the N-channel type semiconductor element of the vertical type is measured. Thereafter, in a case where the measured withstand voltage is lower than a reference value, the substrate (**10**) of the first conductivity type is heat-treated so that the product between the impurity concentration of the substrate (**10**) of the first conductivity type and the width of the first layer (**2**) of the first conductivity type between first layers (**3**) of second conductivity type may become equal to the product between the width of the first layer (**3**) of the second conductivity type between the first layers (**2**) of the first conductivity type and the impurity concentration of the first layer (**3**) of the second conductivity type. In this way, impurity ions contained in the first layer (**3**) of the second conductivity type can be absorbed out from this first layer (**3**) of the second conductivity type into an oxide film (**13**).

[0145] Thus, the charge balance between the first layer (**2**) of the first conductivity type and the first layer (**3**) of the second conductivity type can be attained, and the withstand voltage of the semiconductor element can be enhanced.

[0146] In the case of absorbing out the impurity ions of the first layer (**3**) of the second conductivity type into the oxide film (**13**) as stated above, in forming the first layer (**3**) of the second conductivity type, this first layer (**3**) of the second conductivity type should preferably be formed so that the impurity concentration of the first layer (**3**) of the second conductivity type may become higher than the impurity concentration of the substrate (**10**) of the first conductivity type.

[0147] That is, in the case where the impurity ions of the first layer (**3**) of the second conductivity type are absorbed out into the oxide film (**13**) by heat-treating the substrate (**10**) of the first conductivity type, thereby to attain the charge balance between the first layer (**2**) of the first conductivity type and the first layer (**3**) of the second conductivity type, the impurity ions are swept out from the first layer (**3**) of the second conductivity type. Therefore, the impurity concentration of the first layer (**3**) of the second